

Technical Report 1228

**Leadership: Enhancing Team Adaptability
in Dynamic Settings**

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LEADERSHIP: ENHANCING TEAM ADAPTABILITY IN DYNAMIC SETTINGS

EXECUTIVE SUMMARY

Research Requirement:

With increasing frequency, businesses, non-profit organizations, and government agencies are called upon to perform complex, interdependent, and urgent tasks in uncertain, unfamiliar, and often treacherous environments. For no organization is this truer than for the U.S. Army. Effective task performance in such environments requires agility, versatility, responsiveness, and sustainability. These are the hallmarks of adaptive team performance—the ability of team members to individually and cooperatively apply their knowledge and skills to the resolution of urgent, complex, novel, and ambiguous problems in dynamic work settings. Yet, theory and research regarding the individual, team, and leader processes and characteristics that foster adaptive team performance are, unfortunately, quite limited.

Procedure:

We conducted five interrelated research projects, combining research methods and approaches—including comprehensive foundational literature reviews, theory development, experimental research in a laboratory setting, qualitative case study research, and longitudinal survey research in the field—to build new understanding of the ways in which leaders may enhance team learning, coordination, and adaptive performance in dynamic work environments.

Findings:

- Basic research highlighted ways to improve team member skill acquisition on a complex and dynamic task simulation. An orientation toward high performance is often explicitly or implicitly emphasized during training, although learning is the objective. Our research demonstrated that priming trainees' goals toward specific learning (versus performance objectives) and framing the training as an opportunity to build skills (versus a demonstration of trainees' performance ability) are potent means to enhance the nature, focus, and quality of self-regulatory processes, learning, and performance outcomes. Principles from this research may guide the development of simulation tools and guidelines for how team leaders can prompt and shape the acquisition of complex team member skills.
- Our foundational review on team effectiveness examined 50 years of research and documented several critical cognitive processes and attributes (*team climate, shared mental models, and transactive memory*), motivational processes and attributes (*team cohesion, collective efficacy, and group potency*), and behavioral team processes and attributes (*coordination, cooperation, communication; enabling team member competencies; and the cognitive-affective-behavioral processes by which teams dynamically regulate and adapt their performance*) and that have amassed a well developed research foundation that demonstrates their contributions to team effectiveness. The review then examined research on interventions designed to influence those critical cognitive, motivational, and behavioral team processes and

- concluded that team design, team leadership, and team training and development are key leverage points for enhancing team processes and effectiveness.
- Our conceptual analysis of *team* leadership addressed gaps in mainstream leadership literature. Most theories attempt to be universal and focus on the structure of leader behavior; that is, on the behavioral dimensions that characterize effective leadership. Although there is good evidence that this general approach to characterizing leadership is useful, it is also the case that it neglects attending to important differences across contexts, tasks, and time that might influence the nature of effective leadership. Grounding leadership in the team context, considering the dynamic nature of team tasks, and attending to the influence of temporal development yield more process oriented theory. Our theory of dynamic team leadership specifies how team leaders can shape, influence, and harness self-regulatory processes to guide team development and how they should shift developmental emphases to prompt the emergence of key team processes needed for adaptation and effectiveness. This theoretical approach supplements the mainstream leadership literature, establishes more precision with respect to identifying necessary team leader competencies, and provides a basis for specifying team leader development needs.
- Qualitative research conducted in an emergency trauma treatment center underscored the importance of dynamic team leadership. Senior team leaders in this setting engaged in “dynamic delegation,” repeatedly delegating the active leadership role to, and withdrawing the active leadership role from, more junior leaders of the team in response to rapidly changing task contingencies. Dynamic delegation allowed teams to perform reliably while also building their novice team members’ skills.
- Longitudinal team-based research on leadership, diversity, and team conflict highlighted the need for leader responsiveness to their teams’ deep diversity. When team members’ values differ, leaders who structure their teams’ tasks—providing instruction and coaching—may be particularly effective in preventing team conflict and facilitating rapid coordination and adaptation.

Utilization and Dissemination of Findings:

Our research findings have implications for military leadership, training, selection, and team (e.g., platoon) design. The knowledge we are generating can be applied to improve leadership in action, provide training specifications for improving leader development, and improve the design and delivery of both human and technology-based training systems. Our findings can also inform the selection of Soldiers for work in dynamic team settings, shedding light on individual differences that predict effective learning and performance in dynamic settings. Finally, analyses of the role that leaders may play in attenuating the potentially negative effects of value diversity clarifies the leader behaviors likely to be most effective when Soldiers’ values differ.

LEADERSHIP: ENHANCING TEAM ADAPTABILITY IN DYNAMIC SETTINGS

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Leadership: Enhancing Team Adaptability in Dynamic Settings

With increasing frequency, businesses, non-profit organizations, and government agencies are called upon to perform complex, interdependent, and urgent tasks in uncertain, unfamiliar, and often treacherous environments. For no organization is this truer than for the U.S. Army. Effective task performance in such environments requires agility, versatility, responsiveness, and sustainability. These are the hallmarks of adaptive team performance—the ability of team members to individually and cooperatively apply their knowledge and skills to the resolution of urgent, complex, novel, and ambiguous problems in dynamic work settings. Theory and research regarding the individual, team, and leader processes and characteristics that foster adaptive team performance are, unfortunately, quite limited.

Research Focus and Guiding Conceptual Framework

To begin to fill this gap, we conducted a multifaceted, multilevel, and multi-method research program designed to shed new light on the individual differences, team characteristics, and leadership practices that enable individual and team adaptive performance within dynamic work environments. Our research focused on three critical questions:

1. How do individual differences (e.g., goal orientation, values) influence individuals' acquisition of the knowledge and skills necessary for adaptive individual performance?
2. How do teams comprised of individuals who differ in their knowledge, skills, traits, and values acquire the ability to work interdependently and cooperatively to achieve adaptive team performance?
3. What can leaders do to enhance these processes?

Our Research Approach: Competencies, Sites, and Methods

Prior research on adaptive team performance has been inhibited by four key challenges: (a) the difficulty of gaining access to real-life dynamic settings in which teams of changing composition face urgent, novel, and unpredictable challenges; (b) the complexity and multidimensionality of the research problem, requiring expertise in learning and self-regulation, team composition and development, and leadership; (c) the need for precise modeling of learning, skill acquisition, and self-regulation under dynamic conditions; and (d) the multilevel nature of the phenomenon of individual and team adaptability, necessitating consideration of both individual and team-level processes and outcomes.

Fortunately, our research team combines access to a real-life, high stress, team-based dynamic work setting—the University of Maryland Shock Trauma Center (STC)—with expertise in learning, team processes, leadership, and multilevel theory-building and research. The STC replicates in important ways the fundamental features of the Objective Army: high-pressure, fast-paced work performed by teams of diverse specialists; novel, unpredictable, ambiguous, and complex tasks with life or death consequences; long work hours; and frequent changes in personnel and team composition. Over 200 medical residents cycle through the STC each year, each spending 1-2 months working in the STC. Like Soldiers, residents struggle to master the tasks assigned to them while gaining the knowledge and skills that enable truly adaptive

performance in a dynamic environment. Residents learn by doing. Indeed, residents come to the STC, where they assume substantial responsibility for the treatment of trauma patients, precisely to gain knowledge and skill in surgery and emergency medicine, as well as in team coordination and leadership. Our field research examined the leadership processes that enhance individuals' and teams' adaptive performance in this dynamic setting, widely regarded as one of the best shock trauma centers in the United States.

In this research effort, we coupled the richness and external validity of field research in the Shock Trauma Center with the internal validity, precision, and theory-testing capabilities of laboratory research at Michigan State University's ADAPT (Accelerated Development: Adaptability, Performance, and Training) Laboratory. The ADAPT Lab is equipped with 20 PC-based simulation systems that may be configured to a variety of complex individual or team tasks. In the ADAPT Lab, we created a simulated dynamic work environment in which to assess the antecedents of adaptive performance.

We conducted five interrelated research projects, combining research methods and approaches, to build new understanding of the ways leaders may enhance team learning, coordination, and adaptive performance in dynamic work environments. These projects included comprehensive foundational literature reviews, theory development, experimental research in a laboratory setting, qualitative case study research, and longitudinal survey research in the field

Following a brief overview of our conceptualization of dynamic work environments, adaptive individual and team performance, and adaptive leadership, we describe each of the five research projects (focus, method, and findings). We conclude with a summary discussion of the key conclusions of our research and directions for future research.

Overview: Individual and Team Performance in a Dynamic Environment

Dynamic Work Environments and the Objective Force

Dynamic work environments differ from traditional work environments in the nature and tempo of the work tasks and in the composition and organization of the workforce (cf., Kozlowski, Gully, Nason, & Smith, 1999). Dynamic work environments, as we use the term, are distinguished by five characteristics:

1. Diverse specialists work in teams to perform highly interdependent tasks;
2. Tasks are high in novelty, uncertainty, and urgency;
3. The pace of work is varied and unpredictable as emergency events occur frequently but at unpredictable times;
4. Team composition (i.e., team membership) changes frequently, such that team members may not know many of the individuals on their team; and
5. Effective task performance is dependent on team member learning, development, and adaptation.

The Shock Trauma Center embodies these characteristics, characteristics we simulated in the MSU ADAPT Lab.

Individual and Team Adaptive Performance

Within dynamic work environments, effective team performance is necessarily adaptive team performance (Kozlowski, 1998). Working with colleagues with whom, in many cases, they are unfamiliar, team members must rapidly and cooperatively assess the novel, urgent, and uncertain task at hand, draw parallels to prior tasks and challenges so as to determine relevant knowledge and skills, develop a work strategy, prioritize their actions, delegate specific responsibilities to specific team members, and take action, while continually monitoring their own progress and revising their plans accordingly. Adaptive performance is thus cooperative, responsive to changing contingencies, decisive (there may be little time for deliberation and delay), grounded whenever possible in prior experience and expertise, creative, experimental, and self-monitoring.

To display such adaptive performance, individuals must have knowledge and skills surpassing basic task proficiency. They must possess not only declarative task-related knowledge (knowledge of task-related facts and information; knowing what) and procedural task-related knowledge (knowledge of task procedures; knowing how), but also strategic task-related knowledge (knowledge of the underlying or deeper complexities of a task). Strategic knowledge involves knowing why, when, and where to apply which of one's declarative and procedural skills (Bell & Kozlowski, 2002; Ford & Kraiger, 1995). Because tasks are novel and unpredictable in dynamic settings, team members also must possess expert problem-solving knowledge and skill; that is, knowledge and skill in gathering, organizing, integrating, and acting on new information. Finally, individuals must possess team-related knowledge and skill if they are to readily coordinate with others—an ability essential for adaptive team performance within a dynamic work environment (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995). Thus, for example, individuals may require knowledge about and skill in communication, delegation, interpersonal relations, decision-making, and performance monitoring.

However, adaptive team performance represents more than the simple gathering together of individuals who possess task-related, problem-solving, and team-related knowledge and skills. The rapid, coordinated responses of an adaptive team within a dynamic work environment reflect team members' shared knowledge: their shared understanding of task goals and requirements; team processes, priorities, and strategies; team norms and routines; and team member competencies and characteristics. Shared team knowledge enhances a team's speed of response, the coordination among its members, and the ease and effectiveness of work implementation (Kozlowski et al., 1999).

In sum, within dynamic work environments, teams comprised of knowledgeable individuals who share a common understanding of team goals, tasks, priorities, strategies, norms, and competencies are most likely to display adaptive performance.

Acquiring Knowledge and Skills That Enable Individual and Team Adaptive Performance: The Slow and Bumpy Road

How do individuals and teams acquire the individual and shared knowledge and skills they need to perform adaptively in dynamic settings? The answer, a growing body of literature suggests, is not classroom training or formal training of any kind, but experience in dynamic settings. Recent research on training and team effectiveness is universal in asserting that the high level knowledge and skills that underlie individual and team adaptive performance are acquired in the work context or in simulations that very closely approximate it (e.g., Cannon-Bowers et al., 1995; Kozlowski, Toney, Mullins, Weissbein, Brown & Bell, 2001). Indeed, extensive practice and domain experience are the key distinguishing characteristics differentiating experts and novices.

With practice and experience, individuals and teams working in dynamic work settings are likely to develop the individual and shared knowledge and skills that enable adaptive performance. The problem, however, is that the road from practice and experience to expertise may be slow and bumpy. Some individuals may have difficulty acquiring task, team, and problem-solving knowledge and skills. They may impede the performance of their teams. Some teams may be slow to coalesce around a common vision and approach. Their team performance may be suboptimal. In short, experience may be a good teacher, but it is neither invariably efficient nor foolproof.

When individuals and teams are slow or unable to acquire the knowledge and skills that enable adaptive individual and team performance, the consequences may be severe. In emergency medical centers—as in the U.S. Army—mistakes in skill execution, judgment, priorities, and coordination may literally have fatal consequences. Accordingly, our research was designed to help: (a) clarify how individuals and teams working in dynamic settings acquire the knowledge and skills they need to perform adaptively; and (b) identify leverage points (i.e., key leadership behaviors, capabilities, and skills) that may enhance the speed and effectiveness with which individuals and teams acquire the knowledge and skills needed to perform cooperatively and adaptively in dynamic settings.

Adaptive Leadership: Enhancing Individual and Team Knowledge Acquisition and Adaptive Performance

Adaptive leadership, we posit, is a particularly promising leverage point. Adaptive leaders engage in behaviors that enhance and develop individual and team knowledge and efficacy. These behaviors include:

1. Clarifying performance goals and strategies;
2. Promoting a learning orientation among team members;
3. Monitoring individual and team performance;
4. Providing feedback and instruction, as necessary and when time permits;

5. Delegating tasks, as appropriate, to provide opportunities for team member learning and practice; and
6. Intervening when necessary to ensure the effective performance of urgent tasks.

Thus, adaptive leadership is itself adaptive to the shifting demands, tempo, and individual and team competencies characteristic of dynamic work settings. Indeed, the leadership role, within an adaptive leadership system, may itself shift among team members, as leaders and team members adapt to changing task demands, work loads, and team membership and competencies (Klein, Ziegert, Knight, & Xiao, 2006). For example, a team leader may delegate specific leadership tasks to the most experienced and knowledgeable team members to enhance their leadership capabilities or because the team leader's skills and attention are urgently needed elsewhere. Our conceptualization of adaptive leadership thus differs markedly from dominant conceptualizations of leadership that appear to assume, implicitly, a relatively static work environment in which tasks, roles, and personnel are quite stable (Kozlowski, Watola, Nowakowski, Kim, & Botero, in press). Adaptive leadership, by definition, is highly contingent, fluid, and flexible.

Preview of the Remainder of the Report

In the sections below, we provide an overview of the five research projects we conducted as part of our research program to examine and illuminate the effects of leadership on adaptive team performance in dynamic work settings. Detailed reports of the project are cited in each section.

The five projects are:

1. Understanding the Antecedents and Processes of Individual Adaptive Performance
2. Understanding Team Effectiveness and Adaptation: Critical Team Processes and Application Levers
3. Understanding the Influence of Dynamic Leadership on Team Development and Adaptive Performance
4. Understanding Dynamic Delegation: A Qualitative Case Study of Team Leadership in an Emergency Trauma Treatment Center
5. Understanding the Leader's Role When Team Members' Values Differ: Leadership, Team Conflict, and Team Effectiveness

We conclude with a discussion of the implications of our conceptual framework and research findings for applied research and practice in the U.S. Army.

Understanding the Antecedents and Processes of Individual Adaptive Performance

A full report of this research project was recently published. The full reference for the project is:

Kozlowski, S. W. J., & Bell, B. S. (2006). Disentangling achievement orientation and goal setting: Effects on self-regulatory processes. *Journal of Applied Psychology, 91*, 900-916.

As teams are comprised of individual team members, individual adaptive performance is a critical building block: a necessary but not sufficient condition for adaptive team performance (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). Individuals display adaptive performance when they have acquired self-regulatory skills and possess requisite task-related and team-related competencies. Such knowledge and skills enable individuals to regulate their effort, task strategies, and affective reactions and to adapt to challenges presented by novel, complex, and ambiguous tasks. *The factors that influence self-regulatory processes—individual differences, goals, and feedback interventions—are potent application levers that can be harnessed by leaders to shape self-regulation and development of team members to enhance their learning, performance, and adaptation.*

Over the last decade or so, skill acquisition research has examined a variety of interventions designed to influence the nature, focus, and quality of self-regulatory processes which, in turn, have been shown to have beneficial effects on motivation, learning, performance, and adaptation. As a result, this type of research has advanced understanding with respect to how to design effective interventions for complex skill acquisition (Salas & Cannon-Bowers, 2001). One limitation of this work, however, is that it has drawn upon related but distinctly different theoretical foundations such that the source of effects on self-regulatory processes is not entirely clear.

One approach draws on trait-based *achievement orientation* theory (i.e., goal orientation) to design *inductions* that influence the nature and focus of regulatory processes. This work has generally examined cues or manipulations that differentially frame the situation as oriented toward learning or task performance (Ames, 1992; Ames & Archer, 1988; Archer, 1994). For example, framing has been used: (a) to prompt a task vs. ego focus (Dweck, 1986; Nicholls, 1984); (b) to influence conceptions of ability as malleable vs. fixed (Wood & Bandura, 1989); or (c) to emphasize exploration, learning from errors, and task mastery vs. outcome achievement, minimizing errors, and demonstrating performance (e.g., Frese, 1991; Ivancic & Hesketh, 1995/1996; Stevens & Gist, 1997).

A related, but distinct, line of work has been *goal-based*, focusing on qualitatively different goals and how distinctive *goal content* influences the focus of self-regulatory processes. This line of work generally manipulates goal content to set either learning and skill goals or performance goals (e.g., Barron & Harackiewicz, 2001; Harackiewicz, Barron, Carter, Lehto, & Elliott, 1997; Winters & Latham, 1996). Another aspect of this work has focused on whether such goals are presented as a more proximal sequence or as a distal terminal goal. The common prediction is that proximal goals are better standards of progress than are distal goals and that proximal goal sequences facilitate self-regulation (e.g., Bandura & Schunk, 1981; Kozlowski,

Gully, Brown, Salas, Smith, & Nason, 2001; Latham & Seijts, 1999; Manderlink & Harackiewicz, 1984; Winters & Latham, 1996).

Although these studies have advanced our understanding of complex skill acquisition (Kozlowski, Toney, et al., 2001), they also have tended to blend conceptions across the two domains. Investigators have developed a variety of interventions that work, but the distinct source of effects is often unclear. A theoretical integration of the goal-setting and achievement orientation domains and a disentangling of their distinct effects are needed. Initial efforts include Kanfer's insightful conceptual analysis (1990), the integration of motivational traits and skills (Kanfer & Heggstad, 1997), the effects of achievement orientation traits on goal setting (Phillips & Gully, 1997) and goal states (Chen, Gully, Whiteman, & Kilcullen, 2000), and the distinct effects of achievement orientation traits and goal content manipulations on learning and performance (e.g., Kozlowski, Gully, et al., 2001; Seijts, Latham, Tasa, & Latham, 2004).

The purpose of this research was to build on this initial work toward integration. There are several expected contributions of this effort. First, examining these approaches simultaneously but distinctly enables determination of the relative effects of the different approaches on self-regulatory processes. This allows identification of the sources responsible for observed effects and, hence, interventions that are likely to have the greatest utility for improving the focus and quality of self-regulation. Second, disentangling these approaches empirically provides a better understanding of the mechanisms for their effects. This will facilitate theory building and also provide information that can be used to improve training design. Finally, and perhaps most central to our perspective, is the fact that disentangling these approaches allows one to examine how effects differ depending on their combination.

Using a complex computer-based simulation, we examined the effects of three design factors cutting across these two theoretical domains on the nature, focus, and quality of the self-regulatory activities of 523 trainees. More specifically, we manipulated: (a) goal frame (goal frame encouraging learning orientation versus goal frame encouraging performance orientation); (b) goal content (goals specifying new skills and information to be learned versus goals specifying performance scores to be met); and (c) goal proximity (proximal goals presented for each training block vs. distal goals presented for the end of training as a whole).

Based on prior research findings, tangible goal content was expected to have potent effects on self-regulation (with learning goals expected to be superior), goal frame was expected to have an effect on self-regulation, albeit a less potent one (with learning frame expected to improve the quality of self-regulation), and goal proximity was expected to influence motivation (with proximal goals expected to have more positive effects). Moreover, based on the theoretical integration, some complex interactions between goal frame and goal content also were expected. When goal frames and content were congruent (i.e., learning frame and learning goals vs. performance frame and performance goals), learning was expected to yield enhanced self-regulatory processes and outcomes relative to performance. Incongruent pairings of goal frames and content were expected to be intermediate in effectiveness, with a learning frame coupled with a performance goal expected to be superior to a performance frame coupled with a learning goal.

Results revealed that all three factors had a significant influence on self-regulatory processes, with goal content exhibiting the greatest influence. In line with the expectations

summarized above, congruent learning frame and content relative to congruent performance frame and content was beneficial for trainees' self-regulatory activity, incongruent combinations of goal frame and content were better than congruent performance frames and content, and effects for the incongruent combinations cutting across the domains were asymmetrical such that a learning frame coupled with a performance goal was better than a performance frame coupled with a learning goal. *The bottom line finding is that trainers, leaders, and training systems (i.e., simulations, e-learning) need to emphasize achievement oriented learning goals, rather than performance oriented consequence goals, to prompt learning, skill acquisition, and the self-regulatory processes that underlie adaptation.* Theoretical extensions for further disentangling these distinct domains and training design implications are discussed in Kozlowski and Bell (2006).

Understanding Team Effectiveness and Adaptation: Critical Team Processes and Application Levers

A full report of this research project was recently published. The full reference for the project is:

Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams (Monograph). *Psychological Science in the Public Interest*, 7, 77-124.

A key aspect of our strategy to examine how leaders can shape and enhance team effectiveness and adaptation was to first comprehensively map the relevant literature. This strategy was designed to identify critical team processes that enhance effectiveness, narrow the individual and team processes that would be targets for intervention, and identify promising interventions to guide current as well as future research. In that sense, we regarded this comprehensive review as an investment that would pay off in other research efforts as well. Other recent reviews of this domain have either been more expansive (Kozlowski & Bell, 2003) or narrower in scope (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). The goal of this research project was to focus on the identification of well established factors that influence team effectiveness and demonstrated interventions.

More than 50 years of psychological research, including literally thousands of studies, have focused on understanding and influencing the processes that underlie team effectiveness. The goal in this monograph was to sift through this voluminous literature to identify *what we know, what we think we know, and what we need to know* to improve the effectiveness of work groups and teams. The monograph begins by defining team effectiveness and establishing critical conceptual considerations that underlie our approach to understanding it. It then turns to the review, which concentrates primary attention on topics that have established well-developed theoretical and empirical foundations, to ensure that conclusions and recommendations are on firm footing. The first focus is on cognitive, motivational-affective, and behavioral *team processes* that enable team members to combine their resources to resolve team task demands and, in so doing, achieve effectiveness (see Table 1 for a summary of team process recommendations). Then, having established critical team processes that enable team effectiveness, we identify *interventions or levers* that can shape or align team processes and, in that sense, provide tools and applications for improving team effectiveness (see Table 2 for application recommendations). Topic specific conclusions and recommendations are drawn throughout the monograph.

Team cognitive processes that were examined include *team climate, team mental models and transactive memory*, and *team learning*. Team and unit climate represent a shared understanding of the key goals, or strategic imperatives, driving the team task environment. This climate also creates the motivational press that directs team member resources and has been linked to team effectiveness. Team mental models represent cognitive structures that organize important team knowledge areas, whereas transactive memory represents team members' knowledge about 'who knows what' that enables unique individual knowledge to be accessed by all team members. Together, the two concepts provide a means to capture collective team knowledge relevant to performance. Finally, team learning is more of a representation of the process by which collective knowledge and skills are acquired. Looking across these team

cognitive processes, team climate is mature and application ready, whereas team mental model research is less well developed although the

Table 1

Team Processes and Emergent States Related to Team Effectiveness: Levers, Support, and Recommendations

<i>Team Cognitive Processes and Structures</i>			
Process	Levers	Support	Recommendations
Unit and Team Climate	<ul style="list-style-type: none"> ▪ Strategic imperatives; goals ▪ Leadership ▪ Interpersonal interaction ▪ Contextual influences 	<ul style="list-style-type: none"> ▪ Body of systematic theory, method development, and research 	<ul style="list-style-type: none"> ▪ Continuing research to refine ▪ Application ready
Team Mental Models	<ul style="list-style-type: none"> ▪ Training ▪ Leadership ▪ Shared experience 	<ul style="list-style-type: none"> ▪ Body of systematic theory, method development, and research 	<ul style="list-style-type: none"> ▪ Continuing research to refine ▪ Application ready
Transactive Memory	<ul style="list-style-type: none"> ▪ Not well specified ▪ Familiarity ▪ Face to face interaction ▪ Shared experience 	<ul style="list-style-type: none"> ▪ Theory and emerging research 	<ul style="list-style-type: none"> ▪ Promising ▪ Need research on construct refinement, assessment techniques, and antecedents
Team Learning	<ul style="list-style-type: none"> ▪ Not well specified ▪ Shared experience 	<ul style="list-style-type: none"> ▪ Limited support 	<ul style="list-style-type: none"> ▪ Promising ▪ Need conceptual clarity, basic construct development, measurement, and antecedents

Table 1 (continued)

<i>Team Interpersonal, Motivational, and Affective Processes and Emergent States</i>			
Process	Levers	Support	Recommendations
Team Cohesion	<ul style="list-style-type: none"> Not well specified Shared experience Leadership 	<ul style="list-style-type: none"> Body of systematic theory and research Meta-analytic findings 	<ul style="list-style-type: none"> Related to team effectiveness Need theory and targeted research on antecedents Application ready
Team Efficacy and Group Potency	<ul style="list-style-type: none"> Training Leadership Mastery experiences Persuasion 	<ul style="list-style-type: none"> Body of systematic theory and research Meta-analytic findings 	<ul style="list-style-type: none"> Related to team effectiveness Need targeted research to refine antecedents Application ready
Team Affect, Mood, and Emotion	<ul style="list-style-type: none"> Member similarity Social contagion Contextual influences 	<ul style="list-style-type: none"> Theory and emerging research 	<ul style="list-style-type: none"> Promising Need to refine conceptual clarity, construct distinctions Need integration with research on cohesion and conflict
Team Conflict	<ul style="list-style-type: none"> Interpersonal skills Conflict management skills Trust 	<ul style="list-style-type: none"> Meta-analytic findings 	<ul style="list-style-type: none"> Need research to refine <i>how</i> conflict impedes team performance More research on factors that mitigate team conflict
<i>Team Action and Behavioral Processes</i>			
Process	Levers	Support	Recommendations
Team Coordination, Cooperation, and Communication	<ul style="list-style-type: none"> Design Training Leadership 	<ul style="list-style-type: none"> Body of systematic theory and research Meta-analytic support for levers 	<ul style="list-style-type: none"> Need to refine levers Application ready
Team Member Competencies	<ul style="list-style-type: none"> Design Training Leadership 	<ul style="list-style-type: none"> Body of systematic theory and research Meta-analytic support for levers 	<ul style="list-style-type: none"> Need to refine levers Application ready
Team Regulation, Performance Dynamics, and Adaptation	<ul style="list-style-type: none"> Design Training Leadership 	<ul style="list-style-type: none"> Body of systematic theory and research Meta-analytic support for levers 	<ul style="list-style-type: none"> Need to refine levers Application ready

Table 1 from: Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams (Monograph). *Psychological Science in the Public Interest*, 7, 77-124.

Table 2
Team Effectiveness Levers and Recommendations

Levers	Comments and Recommendations
<i>Team Design - Task and System Design</i>	
Group Composition	Apply individual-level assessment tools for selection; need research on composition patterns
Role Design	Promising work on structural adaptation, team performance modeling, and team member modeling; preliminary applications; more work needed
Collaborative Tools	Need theory to guide tool design; need research on tool use, team processes, and team effectiveness
<i>Team Design - Performance Regulation and Adaptation</i>	
Goal Setting	Meta-analytic support, potent effects, extended to team level; application ready
Feedback	Promising research support, likely to be potent; preliminary applications; more work needed
PROMeas	Integrates goals and feedback; demonstrated applications; application ready
Technology Augmentation	Very promising technology; preliminary applications; more work needed
<i>Team Training and Development - Training Strategies</i>	
Team Member Training	Promising support for effectiveness; demonstrated applications; application potential; research to refine
Cross Training	Meta-analytic support for effectiveness; demonstrated applications; application ready; research to refine
Simulation-Based Training	Meta-analytic support for effectiveness; demonstrated applications; application ready; research to refine
Adaptability-Coordination-CRM	Meta-analytic support for effectiveness; demonstrated applications; application ready; research to refine
<i>Team Training and Development - Team Development</i>	
Descriptive Models	Promising theory; need rigorous large sample longitudinal research to map domain, guide normative models
Normative Models	Promising broad-based theory; limited support; need research to evaluate key model propositions
<i>Leadership in General - Research to extend findings below to the team level using team performance criteria sorely needed</i>	
Task and Support Behaviors	Meta-analytic support; demonstrated applications; application ready
Transformational and Transactional Leadership	Meta-analytic support; demonstrated applications; application ready
Leader-Member Exchange	Meta-analytic support; demonstrated applications; application ready
<i>Team Leadership</i>	
Task Functions	Meta-analytic support; theory based applications need development and evaluation
Developmental Functions	Meta-analytic support; theory based applications need development and evaluation

Table 2 from: Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams (Monograph). *Psychological Science in the Public Interest*, 7, 77-124.

concept is application ready. Transactive memory shows preliminary application potential and team learning is still undergoing basic conceptual development.

Team interpersonal, motivational, and affective processes considered include *cohesion, efficacy, and potency; affect, mood, and emotion; and conflict*. Among these concepts, cohesion, efficacy, and potency have well developed research foundations linking the processes to team effectiveness. Team cohesion entails team member attraction, task commitment, and loyalty. Team efficacy represents a shared confidence in the team's ability to accomplish its task, whereas team potency is a more generalized shared perception of team competence. All three team processes evidence the potential to be influenced, and therefore are application targets. Research on the other topics is less well developed so that although they are likely to be important contributors to team effectiveness, the conceptual and research foundations need more elaboration before solid recommendations can be made.

The team behavioral processes that we examined focus on *coordination, cooperation, communication; enabling team member competencies; and the cognitive-affective-behavioral processes by which teams dynamically regulate and adapt their performance*. These topics are a challenge to summarize succinctly. There is a well developed research foundation for the competencies that underlie team coordination and performance, and there is a confluence of promising work that is elaborating the performance regulation and adaptive processes underlying team effectiveness. Several techniques and approaches within this area can be applied to enhance team effectiveness in specific situations.

Turning to the interventions or levers of the team processes highlighted above, our review centered on *team design, team training and development, and team leadership*. There is a substantial research foundation supporting specific interventions that cut across these areas, although team development is the one area where we have lots of theory and little solid data. Nonetheless, there is considerable actionable knowledge to improve the design of teams and their context, and to use team training to provide process underpinnings and leadership to shape process development. Our recommendations are to apply the science to enhance team processes and team effectiveness.

Our review also highlighted the *potential* importance of leadership to team effectiveness (Kozlowski & Ilgen, 2006). In general, leadership theory and research suggest that leadership is an important factor affecting team processes and outcomes. And yet, it is important to acknowledge that most leadership theories and research do not explicitly focus on team settings; the theories tend to be positioned as more generally applicable. Notably, the most common criterion for leadership effectiveness is individual perceptions of effectiveness, rather than team performance or team effectiveness. Thus, the implications of the findings from leadership research for team effectiveness are indirect rather than direct. Although we suspect that ratings of leadership effectiveness are likely to have a bearing on team effectiveness, we also believe that leadership theory and research need to focus on the team level. Nonetheless, meta-analytic findings from this heavily researched domain supporting several "mainstream" theories of leadership—including the behavioral style approach (Judge, Piccolo, & Ilies, 2004), transformational/transactional (Judge & Piccolo, 2004), and leader-member exchange (Gerstner

& Day, 1997) provide a useful indication of the potential value of leadership in the promotion of team effectiveness and merit attention.

In sum, there is a solid foundation for concluding that there is an emerging science of team effectiveness and several means to improve it. In the concluding section, we summarize our primary findings to highlight specific research, application, and policy recommendations for enhancing the effectiveness of work groups and teams.

Understanding the Influence of Leadership on Team Development and Adaptive Performance

A full report of this research project is in press. The full reference for the project is:

Kozlowski, S. W. J., Watola, D., Nowakowski, J. M., Kim, B., & Botero, I. (in press). Developing adaptive teams: A theory of dynamic team leadership. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (SIOP Frontiers Series). Mahwah, NJ: LEA.

As we noted above, general leadership theories have useful but indirect implications for team effectiveness. In part, this is because they take a structural approach, focusing on the identification of a general set of behaviors that are broadly applicable across a wide variety of situations, tasks, and teams. Although such an approach is useful, it is also deficient contextually and static in nature. That is, it neglects unique aspects of the team task context and the dynamic processes by which team members, over time, develop, meld, and synchronize their knowledge, skill, and effort to yield team effectiveness. Theory development regarding the dynamic process of leadership and the means by which leaders can shape team development, adaptation, and effectiveness has been the primary target of this research effort.

As illustrated in Figure 1, most mainstream theories of leadership are intended to be universal, focusing on leadership across all contexts and levels of the organization, and are largely static, assuming that leadership is a stable phenomenon. Functional leadership theory (McGrath, 1962) has centered on level of the team and individuals embedded in teams. According to McGrath, the leader is responsible for ensuring that all necessary functions for team task accomplishment and the maintenance of member interpersonal and social relationships are accomplished. The leader does this by monitoring the team and taking necessary action to deal with internal or external challenges that might interfere with the task or social functions. A number of other scholars have contributed to the development of this perspective over the intervening years (e.g., Fleishman, Mumford, Zaccaro, Levin, et al. (1991); Hackman & Walton, 1986; Komaki, Desselles, & Bowman, 1989; Lord, 1977; Zaccaro, Blair, Peterson & Zazanis 1995, among others).

More recent work in this tradition has centered on leader functions that underlie team learning and development. For example, Edmondson (1999) viewed the primary role of the leader in promoting team learning as one of establishing a shared group climate for safety, so members could experiment, take risks, and stretch their skills. Drawing on Fleishman et al. (1991), Zaccaro et al. (1995) provided a broad framework encompassing four superordinate and thirteen subordinate leadership functions. Of interest is their attention to the leader's role in team learning by prompting the development of team mental models, collective information processing, and team meta-cognitive processes. Hackman and Wageman (2005) proposed a model of team coaching in which they posit that leaders can positively influence team learning and development by providing motivational functions (getting familiar) early in a team's work cycle, consultative functions (task strategies) at the mid point of its work, and educational functions (reflection) at the end of a meaningful *task* episode or piece of work.

Features	Leadership in General	Team Leadership
Approach	<ul style="list-style-type: none"> ▪ <i>Structure</i> of leadership 	<ul style="list-style-type: none"> ▪ <i>Process</i> of leadership
Contingencies	<ul style="list-style-type: none"> ▪ If considered, fixed to leadership situation ▪ <i>May vary across</i> situations 	<ul style="list-style-type: none"> ▪ Dynamic task and developmental contingencies ▪ <i>Varies within</i> situation
Level of Focus and Member Role Linkages	<ul style="list-style-type: none"> ▪ Ambiguous, primarily individual level ▪ Roles not distinguished, loosely connected; additive contributions 	<ul style="list-style-type: none"> ▪ Individual <i>and</i> team levels ▪ Distinctive roles, tightly coupled; coordination requirements
Emphases	<ul style="list-style-type: none"> ▪ Universal ideal ▪ Or, if contingencies, fitting leader to situation, task, subordinates, etc. 	<ul style="list-style-type: none"> ▪ Regulating team processes to build skills, fit to shifting internal and external demands ▪ Transitioning focus of development as skills compile
Distinctive Features and Conclusion	<ul style="list-style-type: none"> ▪ Focus on structure of leadership ▪ Focus on individuals ▪ Context free or fixed ▪ Universal and static 	<ul style="list-style-type: none"> ▪ Focus on process of leadership ▪ Focus on individuals and teams ▪ Contingent on context dynamics ▪ Leadership and team processes as dynamic, fluid, and emergent

Figure 1. *Leadership in general and team leadership: Distinguishing features.*

Figure 1 from: Kozlowski, S. W. J., Watola, D., Nowakowski, J. M., Kim, B., & Botero, I. (in press). Developing adaptive teams: A theory of dynamic team leadership. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (SIOP Frontiers Series). Mahwah, NJ: LEA.

In this project, we built on the research and theory described above, as well as our own prior theory and research (e.g., Kozlowski, Gully, McHugh et al., 1996; Kozlowski, Gully, Salas et al., 1996) and theory and research regarding regulatory processes (Karoly, 1993), team development (Tuckman, 1965), and multilevel theory (Rousseau, 1985) to develop a normative theory of dynamic team leadership.

Figure 2 illustrates primary aspects of the theory. A key aspect of the model is that it specifies dynamic environmental, developmental, and task episode contingencies that should influence that application of leader functions. Team tasks are viewed as linked to an embedding environment or broader organizational system that is a source of team task demands; these demands necessitate appropriate team processes for resolution, which then yield team performance outputs that cycle back to the context in an adaptive loop.

The overarching role of the leader is to guide and shape the acquisition of member capabilities so the team can eventually regulate this systemic transformation process itself. The primary leader function is task-based or instructional: The leader has to manage dynamic contingencies that arise from the environment (variations in environmentally driven task complexity) and link task variations to the regulatory processes of setting learning goals, monitoring progress and intervening to aid the team as needed, diagnosing performance deficiencies, and guiding process feedback. This instructional function stimulates team member regulation and the acquisition of targeted knowledge and skills. A second primary leader function is developmental. As team members compile basic knowledge and skills, the leader prompts transitions to focus the team on acquiring progressively more advanced skills and capabilities (Kozlowski et al., 1999). Over time, this dynamic leadership process of shaping regulation and transitioning the focus of skill development is expected to yield team level regulation and adaptive teams (Kozlowski et al., in press). In sum, the model suggests that team leaders are key agents for creating learning experiences (i.e., creating exercises, harnessing ongoing tasks) for prompting, guiding, and shaping team learning and the development of adaptive teams.

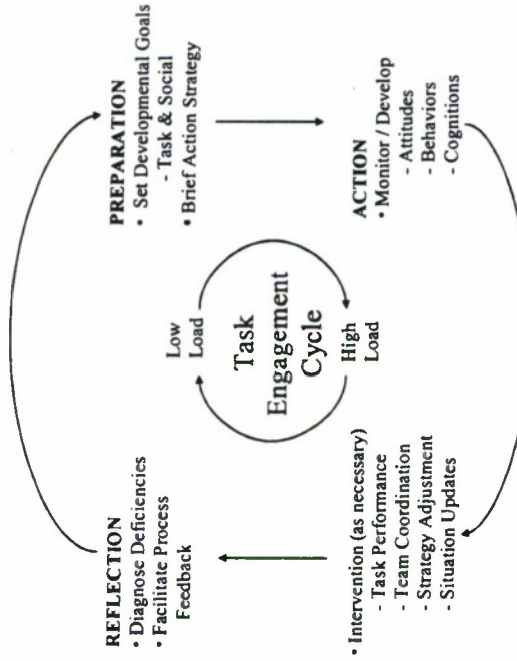
Although there are no direct evaluations of the efficacy of this theory, research examining key aspects of the model including the regulatory process engine (Chen et al., 2000 DeShon et al., 2004) and the developmental shift in level (DeShon et al., 2001) have been supportive.

Our conceptual work on this topic is continuing. We (Kozlowski and his students) are now addressing the specific leader competencies needed to operationalize the dynamic leadership functions.

Team Development Dynamics

<u>Phase</u>	<u>Team Formation</u>	<u>Task & Role Development</u>	<u>Team Development</u>	<u>Team Improvement</u>
<u>Team</u>	New	Novice	Expert	Adaptive
<u>Leader</u>	Mentor	Instructor	Coach	Facilitator
<u>Focus</u>	Identification & Commitment	Taskwork Capability	Teamwork Capability	Adaptive Capability

Within Phase Task Dynamics



Multiple iterations of the task engagement cycle within a phase provide the leader with a series of opportunities to build targeted team member skills.

As team members acquire the targeted skills within a phase, they are prepared to transition to more complex skill sets in the next phase.

As the leader guides team development, the team becomes increasingly a self-managing and self-regulating entity capable of adaptation.

Figure 2. Task engagement cycles and developmental phase transitions.

Figure 2 from: Kozlowski, S. W. J., Watola, D., Nowakowski, J. M., Kim, B., & Botero, I. (in press). Developing adaptive teams: A theory of dynamic team leadership. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (SIOP Frontiers Series). Mahwah, NJ: LEA.

Understanding Dynamic Delegation: A Qualitative Case Study of Team Leadership in an Emergency Trauma Treatment Center

A full report of this research project was recently published. The full reference for the project is:

Klein, K. J., Ziegert, J. C., Knight, A. P., & Xiao, Y. (2006). Dynamic delegation: Shared, hierarchical, and deindividualized leadership in extreme action teams. *Administrative Science Quarterly*, 51, 590-621.

To gain insights into the role leaders play in fostering adaptive team performance in dynamic settings, we conducted a qualitative investigation of the leadership of resuscitation teams in the trauma resuscitation unit (TRU) of an emergency trauma treatment center. The TRU teams face exceptional challenges. Their members vary in the level and content of their training. Their composition changes frequently, often from patient to patient, as team members end their shifts of differing lengths or their monthly residency rotations within the trauma center. Their patients bear uncertain, often life-threatening, injuries and conditions.

The TRU teams must provide consistent high-quality patient care and, at the same time, train and develop their novice members. Their tasks are uncertain, unpredictable, urgent, complex, interdependent, and tightly coupled. Lacking detailed knowledge of their patient's injuries and history, they must make quick decisions likely to have immediate and significant consequences. The frequently changing composition of these teams limits the extent to which team members can anticipate each other's skills, knowledge, strengths, and habits.

Sundstrom and his colleagues (Sundstrom, De Meuse, & Futrell, 1990, p. 121) would characterize the teams of the TRU as "action teams"—that is, "highly skilled specialist teams cooperating in brief performance events that require improvisation in unpredictable circumstances." Yet the action teams of the TRU experience extraordinary demands. We thus characterize these teams as *extreme action teams*—action teams whose members (a) cooperate to perform urgent, highly consequential tasks; while simultaneously (b) coping with frequent changes in team composition; and (c) training and developing novice team members whose services may be required at any time.

Guided by recommended strategies for grounded theory development (e.g., Miles and Huberman, 1984; Eisenhardt, 1989; Strauss and Corbin, 1990) and recent exemplars of grounded theory development (e.g., Elsbach and Kramer, 1996; Ibarra, 1999; Bigley and Roberts, 2001), we conducted a qualitative investigation of leadership in the TRU, collecting multiple sources of data. Specifically, we conducted confidential individual interviews, ranging from 30 to 90 minutes, with 33 members of the TRU (i.e., attending surgeons, attending anesthesiologists, surgical fellows, surgical residents, and nurses). Further, we immersed ourselves in the research setting, spending over 250 hours observing patient treatment in the TRU. We supplemented our interview and observation data with archival data from or about the TRU and the Center and interview transcriptions from related, but independent TRU research.

Our findings document a hierarchical, deindividualized, and dynamic system of shared leadership that appears to allow the extreme action teams of the TRU to perform reliably (Weick, Sutcliffe, and Obstfeld, 1999; Bigley and Roberts, 2001) while also developing their most novice team members' skills. At the heart of this system is *dynamic delegation*—senior leaders' rapid and repeated delegation of the active leadership role to, and withdrawal of the active leadership role from, more junior leaders of the team in response to changing task demands.

Within the extreme teams of the TRU, three leaders—the attending, the fellow, and the admitting resident—are arrayed in an explicit hierarchy of expertise and experience. At any given moment, one of these three leaders fills the *active leadership role*, providing strategic direction and ensuring coordination among team members. He or she also may monitor the team, teach team members information or skills they lack, and/or step in to provide hands-on care of the patient, as needed. The active leadership role, we found, shifts from moment to moment among the attending, fellow, and admitting resident as a function of the dynamic delegation process. Senior leaders delegate the active leadership role to junior leaders of the team, or withdraw delegation, in response to their changing perceptions of: (a) the characteristics of the task (the patient's condition); (b) the junior leader's relevant skills and knowledge; and (c) their own relevant skills and knowledge. For example, the more urgent and novel a senior leader perceives a patient's condition to be, the more likely the senior leader is to assume or retain the active leadership role, and the less likely he or she is to delegate the role.

This description of the dynamic delegation process recalls the contingency perspective embodied in leadership theories prominent during the 1970s, such as Fiedler's (1964; 1967) least preferred coworker (LPC) theory, Vroom and Yetton's normative decision model (1973), Hersey and Blanchard's situational leadership theory (1977), and House's path goal theory (1971). In several respects, however, our conceptualization of the dynamic delegation process goes beyond extant theory to challenge core assumptions of the traditional contingency leadership perspective. First, the conceptual model emerging from our findings focuses on a leadership behavior—delegation—largely overlooked in traditional contingency theories of leadership. Second, the conceptual model emerging from our findings suggests that dynamic delegation is most likely to engender reliable performance and the development of junior leaders' skills and knowledge. In contrast, the contingency theories of leadership that dominated the leadership literature during the 1970s focused primarily on leadership behaviors predicted to engender follower satisfaction, commitment, and motivation. And third, our findings suggest a level of dynamism unknown in traditional contingency theories of leadership.

Our findings underscore the distinctive nature of team leadership, as depicted in Figure 1. We present a process model of leadership in which leaders engage in dynamic delegation in response to the rapidly changing contingencies they face. The findings—and the process of leadership we describe—seem highly relevant to the many U.S. Army teams, which like the TRU teams, are characterized by changing team composition, a hierarchy of expertise and authority, rapidly changing task contingencies, and the need to develop novices' adaptive performance capabilities *in situ*.

Understanding the Leader's Role When Team Members' Values Differ: Leadership, Team Conflict, and Team Effectiveness

A full report of this research project is available from the report authors. The full reference for the project is:

Klein, K. J., Knight, A. P., Ziegert, J. C., Lim, B. C., & Saltz, J. L. (2007.) When team members' values differ: The moderating effects of team leadership. Working paper. University of Pennsylvania, The Wharton School.

A key task for the leader of any team is to facilitate the coordination and integration of team members' work efforts and knowledge. Facilitating such coordination and integration may be particularly difficult when team members are highly diverse. The results of recent research suggest that deep diversity (i.e., diversity of team members' psychological characteristics such as skills, personality, and values) may have stronger, more enduring effects on team processes and effectiveness than does surface diversity (i.e., diversity of team members' demographic traits) (Harrison, Price, & Bell, 1998; Jehn, Northcraft, & Neale, 1999). While the detrimental effects of surface diversity on team integration and cooperation may attenuate over time as team members see beyond their initial preconceptions and stereotypes, the effects of deep diversity may strengthen and persist (Harrison, Price, Gavin, & Florey, 2002). Thus, for example, diversity in team members' work-related values may engender long-lasting team conflict. When team members' values differ markedly, team members may struggle to achieve consensus, to coordinate, and to understand one another's goals and priorities (Jehn et al., 1999; Jehn & Mannix, 2001; Kirkman & Shapiro, 2005). As a result, team effectiveness may suffer (Guzzo & Dickson, 1996). In dynamic work settings, conflict arising from team value diversity may dramatically diminish a team's ability to perform adaptively.

What then can a team leader do to diminish or prevent the conflict that may arise in a team whose members are divided in their work-related values? Given scholars' and practitioners' interest in identifying strategies to maximize the benefits and minimize the drawbacks of team diversity (e.g., Milliken & Martins, 1996), the paucity of theory and research addressing this question is surprising. We contribute to the literatures on diversity, leadership, and team effectiveness by proposing and testing an integrative model of the effects of values diversity and leader behavior on team conflict and effectiveness. More specifically, we draw from fundamentals of leadership theory and research (e.g., Fleishman, 1953; House, 1971) to argue that a leader's behavioral style may influence the extent to which values diversity among team members results in team conflict. Leaders who are high in initiating structure may, we suggest, create strong situations, restricting opportunities for team members to express their individual values and thereby lessening the extent to which values diversity yields team conflict. In contrast, leaders who are high in consideration may legitimize individual team members' perspectives, enhancing the expression, salience, and influence of team members' differing values and thus the likelihood of team conflict. Because team conflict may impair team effectiveness (De Dreu & Weingart, 2003), the interactive effects of team leadership and team values diversity may have important consequences not only for team conflict, but for team effectiveness as well.

To test the model, we collected longitudinal survey data from a residential, team-based, 10-month long national service program. Participants in this program worked in interdependent teams assigned to a variety of service projects (e.g., public safety, homeland security, disaster relief, tutoring). Individuals were randomly assigned to teams ranging in size from 9 to 12 members plus a formally designated team leader. We collected data at three time periods. At Time 1, within the first two weeks following team formation, we collected self-report survey measures of respondents' demographic characteristics and values (traditionalism and activity preference, or work ethic). At Time 2, five months later, we collected survey measures of leader behaviors (leader consideration and leader initiating structure) and team conflict. At Time 3, 10 months following team formation and within the final two weeks of the program, we collected member and leader ratings of team effectiveness. Sample size varies across the analyses, but ranges from 62 (for leader ratings of team performance) to 97 (for team-member rated measures.)

Our findings provided considerable support for our theoretical model. Despite the significant, positive correlation between initiating structure and consideration, suggesting that leaders who are high in one approach also tend to be high in the other, the two leadership styles had significant but opposite effects on the values diversity-team conflict relationship. Initiating structure attenuated the positive effects of values diversity on team conflict, whereas consideration exacerbated the effects of values diversity on team conflict. Team conflict mediated the effects of the values diversity-leader behavior interaction on team effectiveness, especially as rated by team members.

Our conceptual model and findings contribute to the literatures on leadership, teams, and diversity by delineating the ways that leaders, through their behaviors, may either heighten (consideration) or diminish (initiating structure) the salience and expression of values diversity within a team. By effectively creating a strong situation (Mischel, 1973), leaders high in initiating structure reduce the salience of team members' differences, imposing top-down, standard procedures and processes for accomplishing team tasks. As a result, teams experience low conflict and high effectiveness, despite team values diversity. Leaders high in consideration, on the other hand, may attend to the concerns, preferences, and beliefs of individual team members, creating weak, ambiguous situations and emboldening team members to express and act out on their value differences. Team conflict may ensue, diminishing team effectiveness.

Our research responds to scholars' calls for theory and empirical analyses of the role that team leaders may play in shaping the effects of diversity (DiTomaso & Hooijberg, 1996; House & Aditya, 1997; Jackson, Joshi, & Erhardt, 2003) and sounds a new and encouraging note for theorists, researchers, and practitioners: team leaders can influence the extent to which deep diversity is a destructive force within their team. In dynamic settings, the ability of diverse team members to coalesce and coordinate rapidly and adaptively is, of course, especially critical. Consistent with Kozlowski and his colleagues' framework (in press), and Figure 2, our findings underscore the importance of the leader as instructor and coach in diminishing team conflict and fostering a team's taskwork and teamwork capabilities.

Conclusion

Our guiding conceptual model of adaptive team performance suggests: (1) that individual differences (e.g., goal orientation, meta-cognitive skill) influence individuals' acquisition of the individual knowledge and skills that enable adaptive performance; (2) that individual adaptive performance is a key building block for team adaptive performance; (3) that team characteristics (e.g., team shared history, team interaction, team diversity) influence teams' development of the shared team knowledge that enables adaptive team performance; and (4) that adaptive leadership behaviors enhance both individuals' and teams' knowledge acquisition and adaptive performance.

Our conceptual framework and the research conducted in this program make several important contributions to existing theory and research, and provide new insights, perspectives, and hypotheses for applied research on the antecedents of individual and team adaptive performance within the U.S. Army. As we have noted, adaptive performance and team leadership have been the subject of surprisingly little research. Further, existing research on these topics is dominated by research within laboratory settings. Research within the laboratory setting allows precise and rigorous measurement and research control, enhancing the internal validity of the research conclusions. Indeed, this is why research within the ADAPT Laboratory played an essential role within our research program. But, field research—research examining adaptive individual and team performance “in the wild”—is much needed to ground and extend existing conceptualizations of adaptive performance and leadership within dynamic settings. Thus, the qualitative analyses of adaptive performance in the Maryland Shock Trauma Center, the quantitative assessment of the moderating and mediating roles of leader behavior given team values diversity, and the resulting interplay between lab and field research represent key strengths of this research program and important contributions to the literature.

Our research program generated significant new findings in the domain of adaptive performance, development, and leadership. In particular:

- Basic research on complex skill acquisition highlighted that orienting team members toward learning (via goal content and goal frames) is a potent means to enhance the nature, focus, and quality of self-regulatory processes, learning, and performance outcomes. Principles from this research may guide the development of simulation tools and guidelines for team leaders.
- Our foundational review on team effectiveness documented several critical cognitive, motivational, and affective team processes that contribute to team effectiveness and pointed to leadership and team development as leverage points for enhancing team effectiveness.
- Our conceptual analysis of dynamic team leadership addressed gaps in the mainstream leadership literature. Our theory of dynamic team leadership specifies how team leaders can shape, influence, and harness self-regulatory processes to guide team development and the emergence of key team processes needed for adaptation and effectiveness.

- Qualitative research conducted in a shock trauma center underscored the importance of dynamic team leadership. Senior team leaders in this setting engaged in “dynamic delegation,” repeatedly delegating the active leadership role to, and withdrawing the active leadership role from, more junior leaders of the team in response to rapidly changing task contingencies. Dynamic delegation allowed teams to perform reliably while also building their novice team members’ skills.
- Longitudinal team-based research on leadership, diversity, and team conflict highlighted the need for leader responsiveness to their teams’ deep diversity. When team members’ values differ, leaders who structure their teams’ tasks—providing instruction and coaching—may be particularly effective in preventing team conflict and facilitating rapid coordination and adaptation.

In sum, our conceptualization of adaptive leadership paints a highly dynamic, fluid picture of leadership within dynamic settings. Adaptive leaders, we have suggested, adjust their leadership behaviors and strategies to fit changes in team tasks, team competencies, and team composition. The same adaptive leader may be highly developmental at one moment—providing subordinates with feedback, instruction, and opportunities to apply their newly acquired knowledge and skills—and highly directive moments later. Our conceptualization thus counters existing, largely static models of leadership, suggesting a new leadership paradigm that may be ideally suited to the Army’s hierarchical structure, diverse membership, commitment to leader development, and increasing deployment in dynamic settings.

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